

Dan Heister in cooperation with Furan Production Co. present:



**GOOD TO KNOW STUFF ABOUT
ELECTRICAL EQUIPMENT AND PCB'S**

OR: “DUDE, I JUST FOUND A TRANSFORMER AT MY SITE. IS IT PCB?”



PCB OVERVIEW - VOLUME AND SCOPE OF PCB USE

- ✘ Polychlorinated biphenyls (PCBs)
 - + Class of industrially useful chemicals
 - + Clear to yellow oily liquid or solid

- ✘ 1.4 billion lbs produced or imported from 1920s to 1977
 - + 99% by Monsanto Corp



PCB OVERVIEW - INDUSTRIALLY USEFUL PROPERTIES OF PCBS

- ✘ Chemically and thermally stable
- ✘ Nonvolatile
- ✘ Nonflammable
- ✘ Dielectric (electrical insulator)
- ✘ Nonpolar (behaves like oil)
- ✘ Dense (sinks in water)

Electrical Equip
Significance

Environmental
Significance

PCB OVERVIEW - INDUSTRIAL USES OF PCBs

- ✘ Capacitors and transformers (77%)
- ✘ Hydraulic systems (6%)
- ✘ Heat transfer systems (2%)
- ✘ Other uses (15%)

LARGE HIGH VOLTAGE EQUIPMENT



Huge-Ass Distribution Transformer, as in:

Typical Substation Transformer





Old "Pot" Style Substation Transformers



Substation Circuit Breakers





Rack of Capacitors in Substation



Capacitors Come in Different Shapes and Sizes
They Hold 1-5 Gallons of 90% PCB.



(They can hold a charge for up to 2 years after being taken off line, so never pick them up by the bushings)

Pole Mount “Can” Transformers



IDENTIFYING PCB, PCB CONTAMINATED, AND NON-PCB EQUIPMENT

- ✘ PCB Equipment: >500 ppm, Most Stringently Regulated In Service and at Disposal, Marking Requirements
- ✘ PCB Contaminated: <499 ppm, Regulated if Spilled and at Time of Disposal
- ✘ Non-PCB: <50 ppm, Regulated if Spilled, Oil May Be Recycled or Burned for Energy Recovery (Conditions Apply)
- ✘ Dilution to Change Category is Prohibited, Retro-Fills Allowed.

IDENTIFYING PCB, PCB CONTAMINATED, AND NON-PCB EQUIPMENT

FACT: The Vast Majority of Electrical Equipment is in the Non-PCB Category.

FACT: PCB Equipment is Most Commonly Found in Heavy Industry: Smelters, Saw Mills, Metal Fabrication, Die Casting, etc..

FACT: Utilities Typically Have Sample Results for All of Their Liquid Filled Equipment on a Database.

FACT: Government and Private Businesses Kinda. Usually Hardcopy.

FACT: Metal Scrappers, Junk Yards, Abandoned Buildings Not So Much. AND,



FACT: The general public find PCB's more terrifying than Scary Clowns and Godzilla **COMBINED!**

“Gosh Dan, can you help us ID equipment so we can protect the public?” Why yes I can.

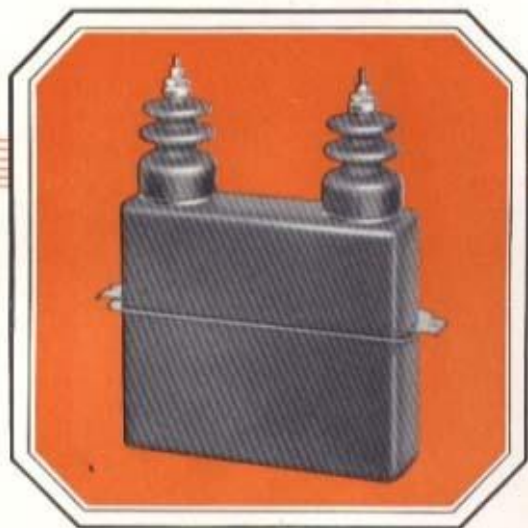


**Always Look For The Yellow Label
(!CUIDADO! Este Transformador es muy
caliente.)**



TRADE NAMES FOR PCB DIELECTRIC FLUIDS

- × (1) *Pyranol* , GE
- × (2) *Inerteen* , Westinghouse
- × (3) *Askarel* , Generic
- × *Asbestol*
- × *Dykanol*
- × *No-Flamol*
- × *Chlorinol* , Sprague
- × Kanechlor
- × Pyralene
- × Elemex
- × Kanechlors
- × Fenclor
- × Saf-T-Kuhl
- × Hi Temp 227
- × Hyvol
- × Therminol
- × Chlorphen
- × Clorextol
- × Kennechlor
- × Euracel
- × Pyroclor
- × Diachlor
- × Inclor
- × Pydraul
- × Phenoclor
- × Santovac 1 and 3
- × Sanotherm



PYRANOL DISTRIBUTION CAPACITORS

Individual Pole-type Units—Class ID

For 2300-, 4000-, 6900-, and 11,950-gr-Y-volt Circuits

FOR improving the power-factor of feeders, and gaining kw capacity on the entire system, back to the generators, the Class ID individual pole-type capacitor units enable more effective distribution of the corrective kva, in smaller blocks and at more points over the entire feeder, than heretofore possible.

The Class ID individual unit is offered in sizes 10 and 15 kva for 2300- and 4000-

volt circuits, and 15 kva for 4600-, 6900-, and 11,950-gr-Y-volt circuits. Compact and readily installed with either crossarm mounting or direct bolting to the pole, the Class ID design is entirely new. However, all the

YOU CAN'T BURN



PYRANOL

fundamental features and vital processes of manufacture embodied in other G-E Pyranol capacitors are maintained, thus assuring the same exceptionally high degree of reliability that distinguishes this product.

GENERAL  ELECTRIC

GENERAL ELECTRIC

THREE PHASE TYPE HT FORM DA CYCLES 60

NO. 7082398 KVA 1350 CONTINUOUS 55 C RISE

VOLTAGE RATIO 480 10500

HIGH VOLTAGE CONNECTIONS		
LINES 1, 2 AND 3		
VOLTS	AMP	DIAL ADJ NO 1, 2, 3
		FOC CONNECTS
		1 A TO B
		2 B TO C
		3 C TO D
		4 D TO E
		5 E TO F

LIQUID LEVEL CHANGES 50 INCH FOR 10°C CHANGE IN LIQUID TEMPERATURE. LIQUID LEVEL BELOW TANK TOP AT 25°C IS 10 INCHES.

ADJ NO 1, 2, 3

FOR OUTDOOR INSTALLATION APPROXIMATE IMPEDANCE

5.66% @ 480 VOLTS

CAUTION BEFORE INSTALLING OR OPERATING READ INSTRUCTIONS GEN-58, GEN-1093, GET-1544Q

U.S. PATENTS 1538170 1558663 1562387
1592400 1600183 1611273 1631455 1644730
N.P. 9243 2245802 2257201

SCHENECTADY, N. Y.

PYRANOL TRANSFORMER

REG. U.S. PAT. OFF.

APPROX WEIGHTS
WHEN UNTANKING 8800 POUNDS
TANK AND FITTINGS 3400 POUNDS
PYRANOL OIL GAL 3400 POUNDS
TOTAL 19600 POUNDS
MADE IN U.S.A.

Precision Mill North

A Name Plates Is Worth A Thousand Words

GENERAL ELECTRIC

TRANSFORMER

NO. 252761B CLASS OA THREE-PHASE 60 HERTZ

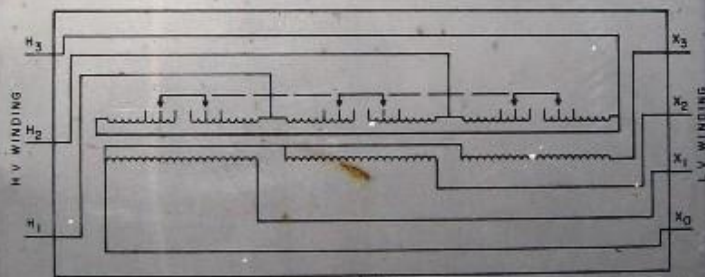
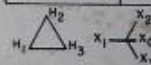
VOLTS 22900 - 6900Y/3984
 KVA RATING 10000 CONTINUOUS 65 CRISE SELF COOLED
 KVA RATING 12500 CONTINUOUS 65 CRISE FUTURE FORCED AIR

IMPEDANCE VOLTS 5.22% 22900 - 6900 VOLTS AT 10000 KVA

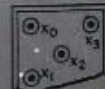
H V WINDING CONNECTIONS		
VOLTS	AMP 10000 KVA	DIAL POS
24100	240	1
23500	246	2
22900	252	3
22300	259	4
21700	266	5

L V WINDING CONNECTIONS		
VOLTS		AMP 10000 KVA
L-L	L-N	
6900	3984	837

BASIC IMPULSE INSULATION LEVELS				
ITEM				KV
H ₁ H ₂ H ₃				150
X ₀ X ₁ X ₂ X ₃				95



HV AND LV WINDINGS ALUMINUM



ELEVATION VIEW
LV END OF TANK

LIQUID LEVEL BELOW TOP SURFACE OF HIGHEST POINT OF MANHOLE FLANGE AT 65 C IS 15 INCHES.
 LIQUID LEVEL CHANGES .86 INCH PER 10 C CHANGE IN LIQUID TEMPERATURE.
 MAXIMUM OPERATING PRESSURES OF LIQUID PRESERVATION SYSTEM 7.5 LBS POSITIVE TO 5 LBS NEGATIVE.
 TANK SUITABLE FOR 14.7 LBS VACUUM FILLING.

APPROX. WEIGHTS IN POUNDS
 TOTAL 46000
 UNTANKING 21500
 TANK AND FITTINGS 1400
 100 OIL 1720 GAL 12900

NP 176B7753

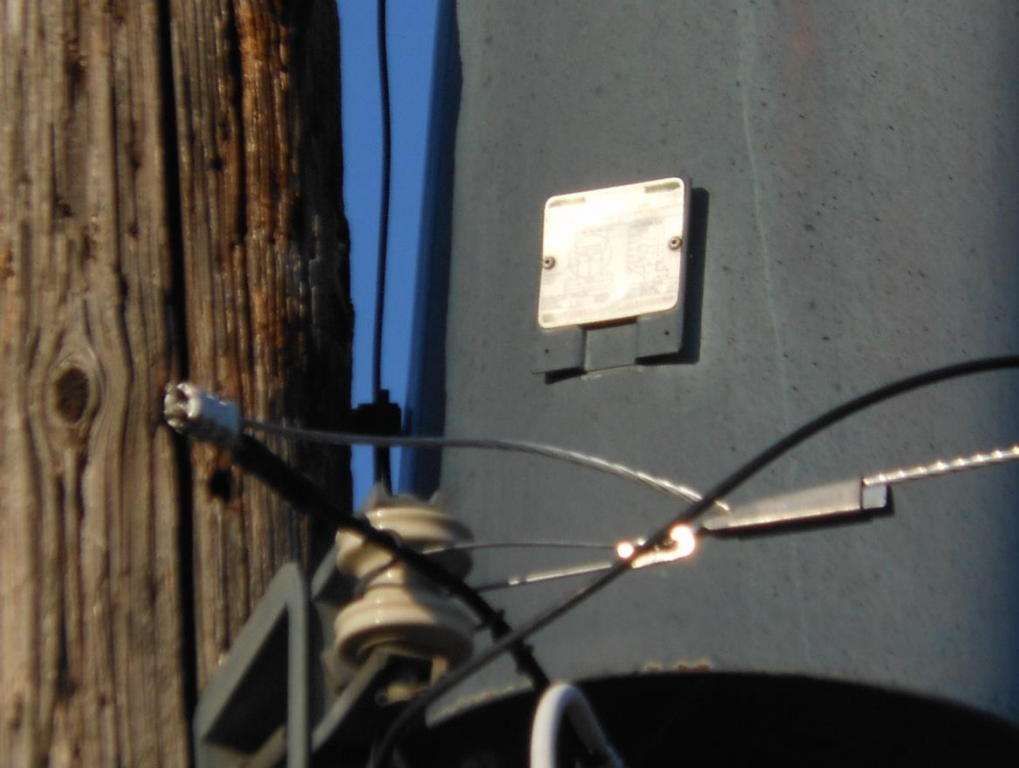
CAUTION BEFORE INSTALLING OR OPERATING READ INSTRUCTIONS

ROME, GEORGIA

MADE IN U. S. A.



Big Things Come In Small Packages. Small High Voltage Equipment Have Small Name Plates. (Post 1979 Caps will almost always say “Non-PCB”)



ASSUMPTION RULE

- ✘ If the word “OIL” is found on the name plate it can be treated as PCB contaminated equipment <499 ppm.
- ✘ You may not use a crayon or sharpie to write “OIL” on the nameplate.

NO “OIL” OR NO NAME PLATE OR UNREADABLE

- ✘ Equipment must be assumed to be PCB equipment and accorded all the honors that are required under TSCA.

ALL ASSUMED TO BE EQUIPMENT MUST BE SAMPLED PRIOR TO DISPOSAL.

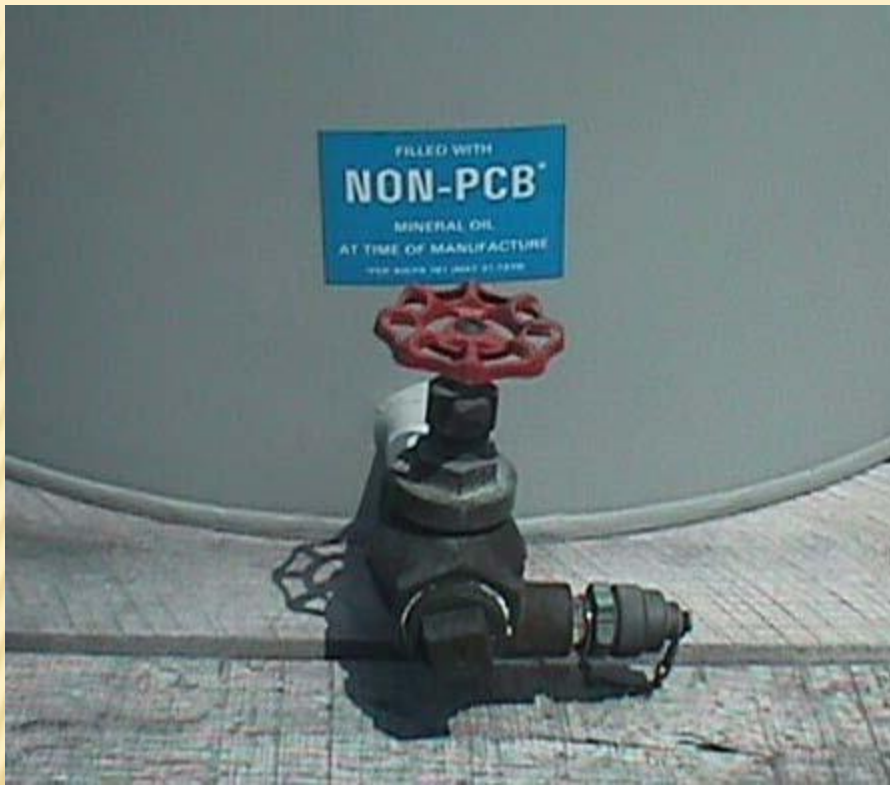
Non-PCB Labeling or
**“It Don’t Mean a Thing If It
Aint’t Got That Sampling.”**



CERTIFIED

THE DIELECTRIC FLUID IN THIS UNIT
HAS BEEN TESTED TO DETERMINE
THE AMOUNT OF POLYCHLORINATED
BIPHENYL(S) (PCB CONTENT). WE
CERTIFY THAT, BASED ON THE TEST
SAMPLE, THE FLUID CONTAINED LESS
THAN 50 PPM PCB AND IS THEREFORE
CLASSIFIED A NON-PCB AS DEFINED
IN THE AUG. 25, 1982, VOL. 47, NO. 165
OF THE FEDERAL REGISTER.

CERTIFIED



Dan's Rule of Thumb:

Brown Bushing

More Suspect Than

Grey Bushing

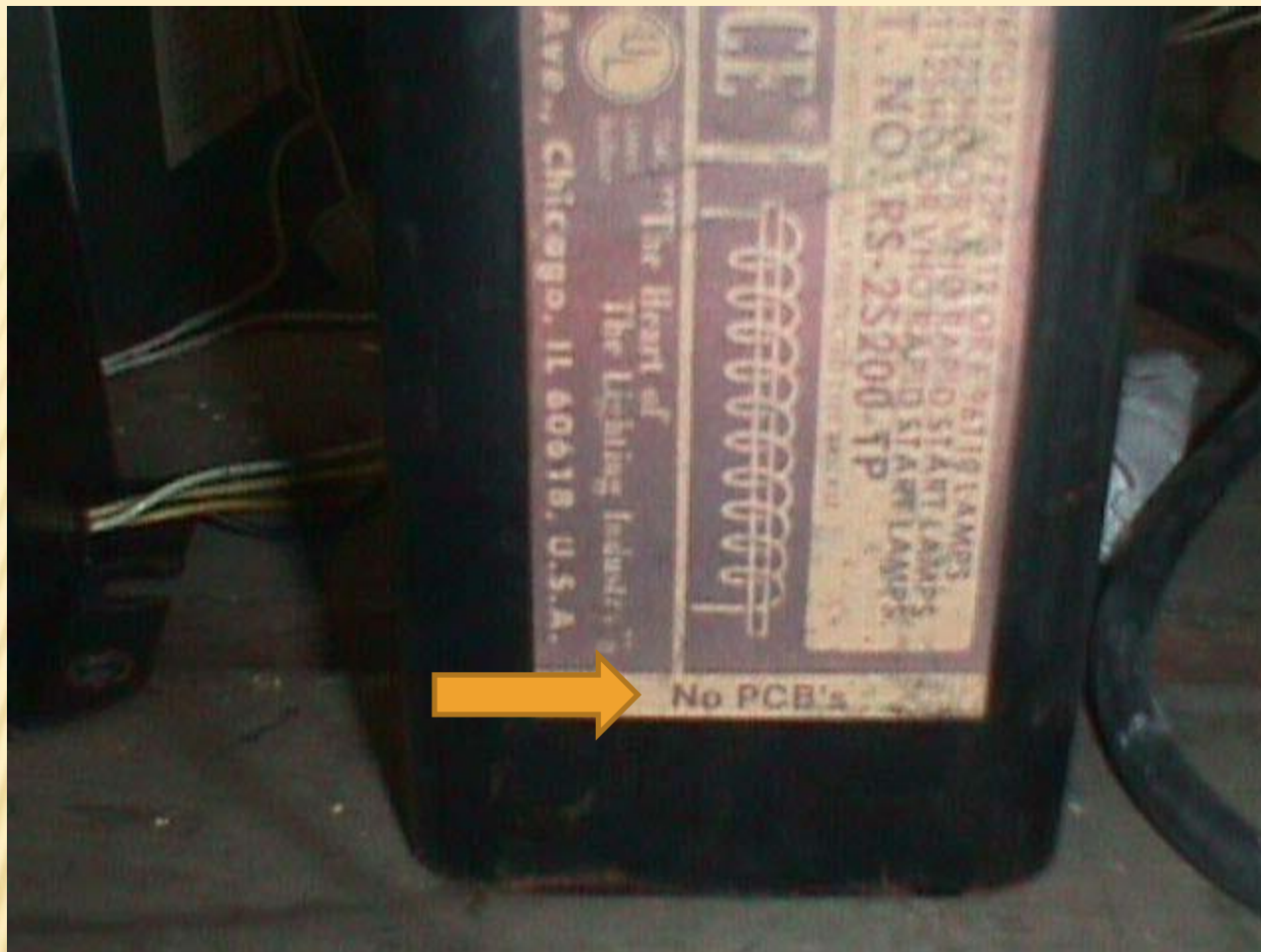


BROWN BUSHINGS INDICATES OLDER EQUIPMENT AND THEREFORE HIGHER RISK OF PCB

Small PCB Equipment. A Different Beast Altogether.



“A Different Beast”



If it doesn't say "No PCB's" or the label is unreadable, It's a PCB ballast and chuck it in the drum.→→



These things never leak.

OTHER SOURCES OF SMALL PCB EQUIPMENT

- ✘ Microwave Ovens
- ✘ Refrigerators and Freezers
- ✘ Toy Train and Car Sets
- ✘ X-Ray Equipment
- ✘ Domestic Well Pumps
- ✘ Arc-Welders
- ✘ Electric Cranes
- ✘ Neon Signs





MODES OF RELEASE



- ✘ Transformer, capacitor, and switch gear container leak or failure

- + Lightning strike, corrosion, struck by accident

- + Fire may produce PCDDs and PCDFs



MODES OF RELEASE



- ✘ Fill and drain spills
 - + Manufacturing and maintenance facilities
 - + Electrical substations
 - + Hydraulic systems

MODES OF RELEASE

- ✘ PCB-contaminated soil
 - + Drain and fill residual
 - + TSCA and RCRA limit is 50 ppm
- Dec 2010
Cu \$3+ per lb
- ✘ Salvage operations
 - + Break open and recover copper
 - + Burn pits / PCDDs and PCDFs



MODES OF RELEASE

- ✘ Manufacturing outfalls
 - + Wastewater outfalls and sludges
 - + Stormwater
- ✘ Demolition debris
 - + Inadequately cleaned spills
 - + Fluorescent lighting ballast
- ✘ Disposal sites
 - + Direct disposal allowed until 1979



QUESTIONS?



“Six-Pack Abs Hell! I’ve Got Pony Keg Abs.”